# P-Channel Enhancement Mode MOSFET TDM3407

## DESCRIPTION

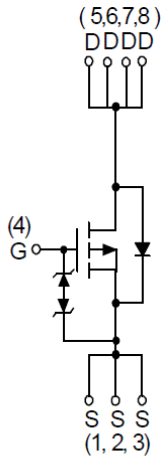
The TDM3407 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

## GENERAL FEATURES

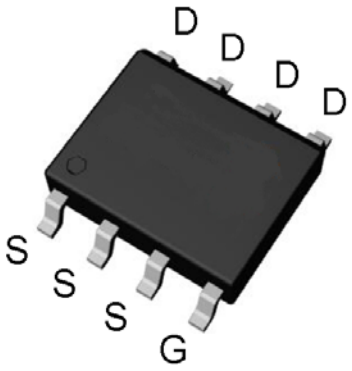
- -40V PMOS
- RDS(ON) < 17mΩ @ VGS=-4.5V
  RDS(ON) < 11mΩ @ VGS=-10V
  RDS(ON) < 9.5mΩ @ VGS=-20V
- Reliable and Rugged
- HBM ESD protection level pass 8KV
- Lead free product is available
- SOP-8 Package

## Application

- PWM applications
- Load switch
- Power management




P-Channel MOSFET




Top View of Sop-8

## ABSOLUTE MAXIMUM RATINGS(TA=25℃unless otherwise noted)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -40 | V |
| Gate-Source Voltage | $V_{GS}$ | ±25 | V |
| Continuous Drain Current($V_{GS}$=-10V) note1 | $I_D$ ($T_A$=25℃) | -16.5 | A |
| | $I_D$ ($T_A$=70℃) | -13.2 | A |
| 300μs Pulsed Drain Current Tested($V_{GS}$=-10V) note1 | $I_{DP}$($T_A$=25℃) | -66 | A |
| Continuous Drain Current (VGS=-10V) note2 | $I_D$ ($T_C$=25℃) | -54 | A |
| | $I_D$ ($T_C$=100℃) | -34 | A |
| 300μs Pulsed Drain Current Tested note2 | $I_{DP}$($T_C$=25℃) | -210 | A |
| Diode Continuous Forward Current note2 | $I_S$ | -25 | A |
| Maximum Power Dissipation note1 | $P_D$($T_A$=25℃) | 4.2 | W |
| | $P_D$($T_A$=70℃) | 2.7 | W |
| Maximum Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature Range | $T_{STG}$ | -55 to 150 | ℃ |

| | | | |
|---|---|---|---|
| Thermal Resistance-Junction to Ambient note1 | $R_{\theta JA}$ | 75 | ℃/W |
| Thermal Resistance-Junction to Lead note2 | $R_{\theta JL}$ | 24 | ℃/W |

NOTES:

1. Surface Mounted on 1in$^2$ pad area, t≤ 10sec. $R_{\theta JA}$ steady state t = 999s.
2. The power dissipation $P_D$ is based on $T_{J(MAX)}$ = 150°C, and it is useful for reducing junction-to-case thermal resistance ($R_{\theta JC}$) when additional heat sink is used.

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| STATIC CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250μA | -40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-32, $V_{GS}$=0V | - | - | -1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±10 | μA |
| ON CHARACTERISTICS (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1.5 | -2 | -2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-4.5V, $I_{DS}$=-15A | - | 14 | 17 | mΩ |
| | | $V_{GS}$=-10V, $I_{DS}$=-25A | - | 9.5 | 11 | mΩ |
| | | $V_{GS}$=-20V, $I_{DS}$=-25A | - | 8.5 | 9.5 | mΩ |
| DYNAMIC CHARACTERISTICS (Note4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-20V,$V_{GS}$=0V, F=1.0MHz | - | 2780 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 425 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 330 | - | PF |
| SWITCHING CHARACTERISTICS (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-20V, $R_L$=20Ω, $V_{GEN}$=-10V, | - | 17 | - | nS |
| Turn-on Rise Time | $t_r$ | $R_G$=6 Ω $I_{DS}$=-1A | - | 14 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 59 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 22 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-20V,$I_{DS}$=-16A,$V_{GS}$=-10V | - | 59 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 8 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 16 | - | nC |
| Body Diode Reverse Recovery Time | $T_{rr}$ | $I_{DS}$=-20A, dI/dt=100A/μs | - | 23 | - | nS |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | - | 10 | - | nC |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=-1A | - | -0.7 | -1 | V |

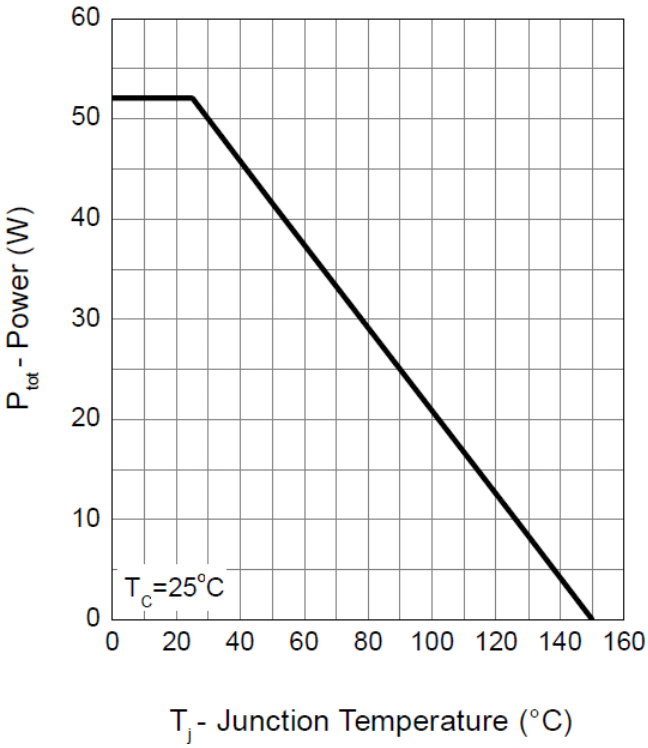
NOTES:

3 Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

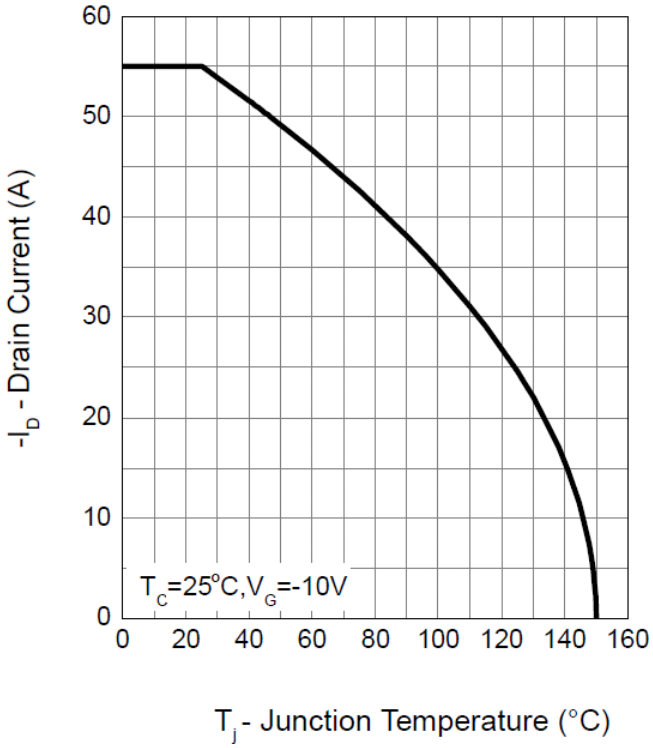
4 Guaranteed by design, not subject to production testing

## Typical Operating Characteristics

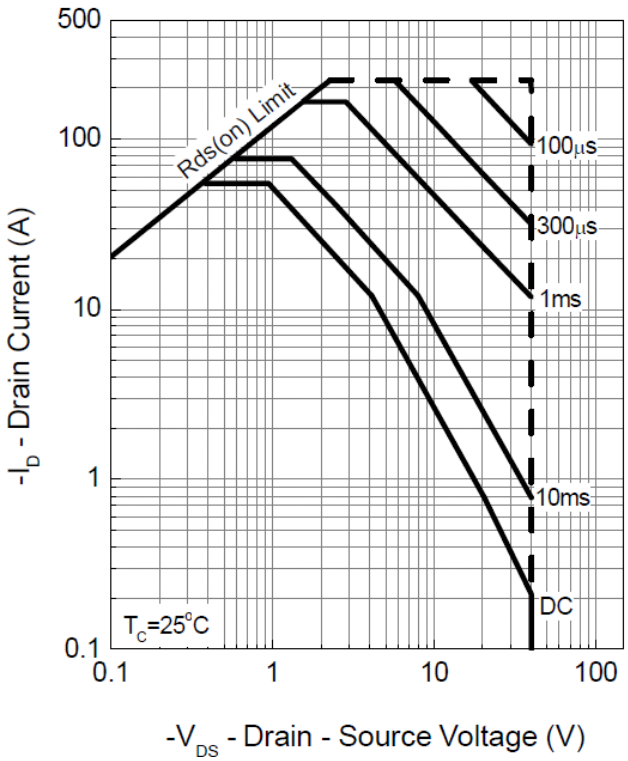
### Power Dissipation



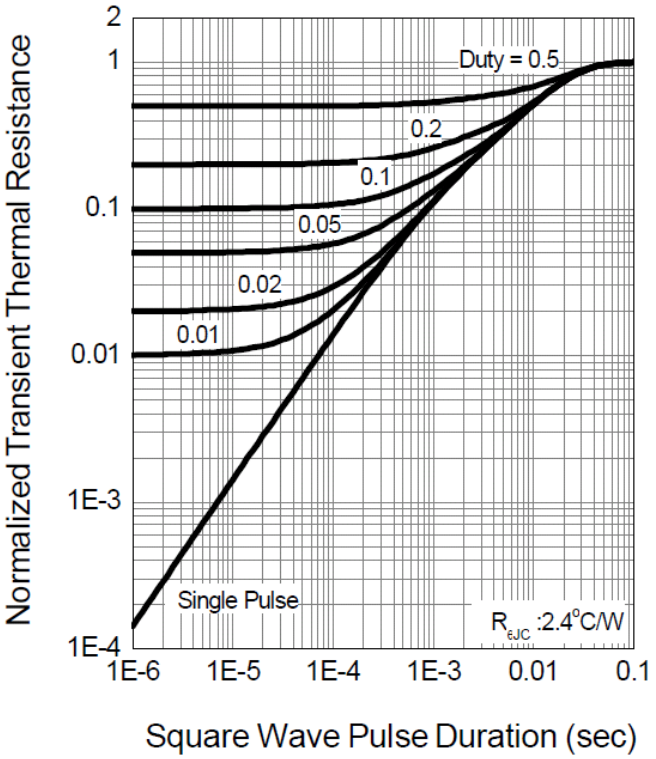

### Drain Current




### Safe Operation Area

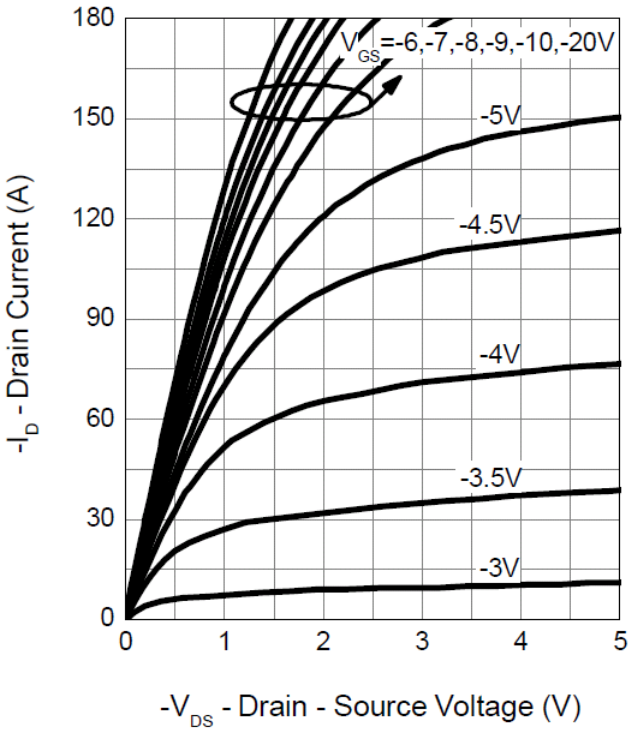



### Thermal Transient Impedance

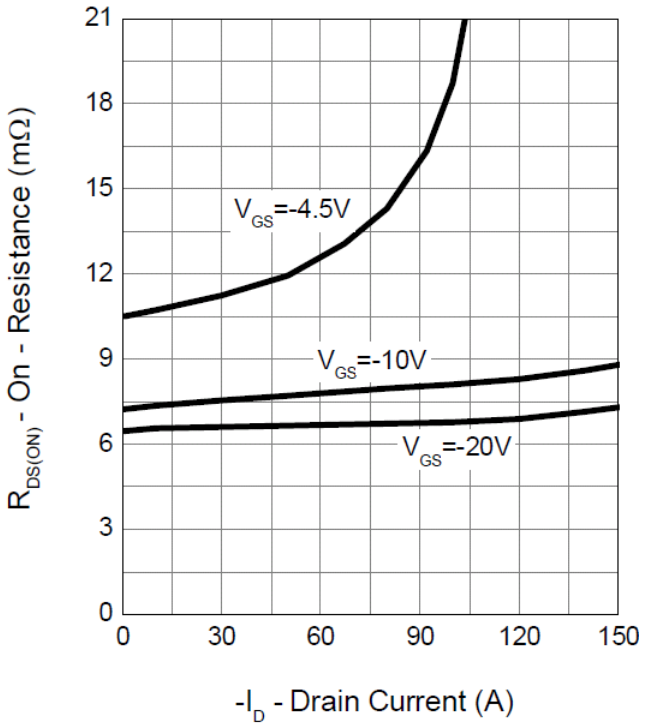


## Typical Operating Characteristics(Cont.)

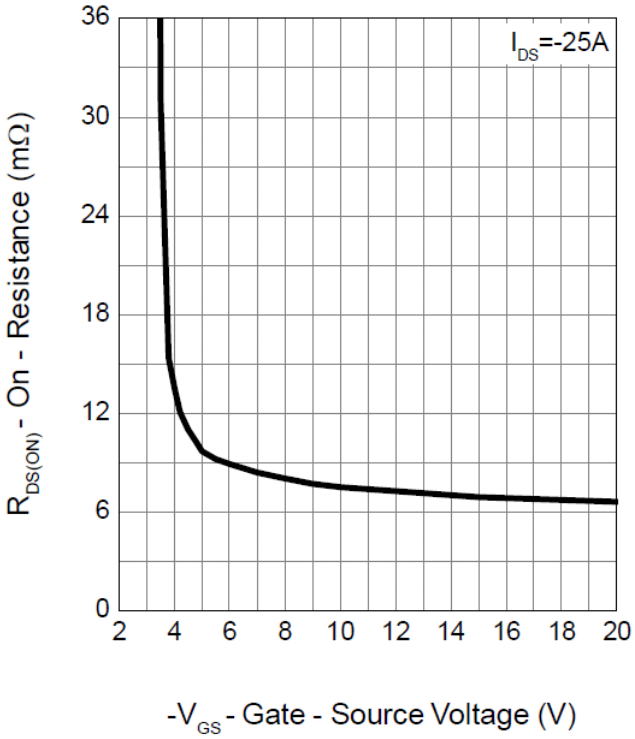
### Output Characteristics



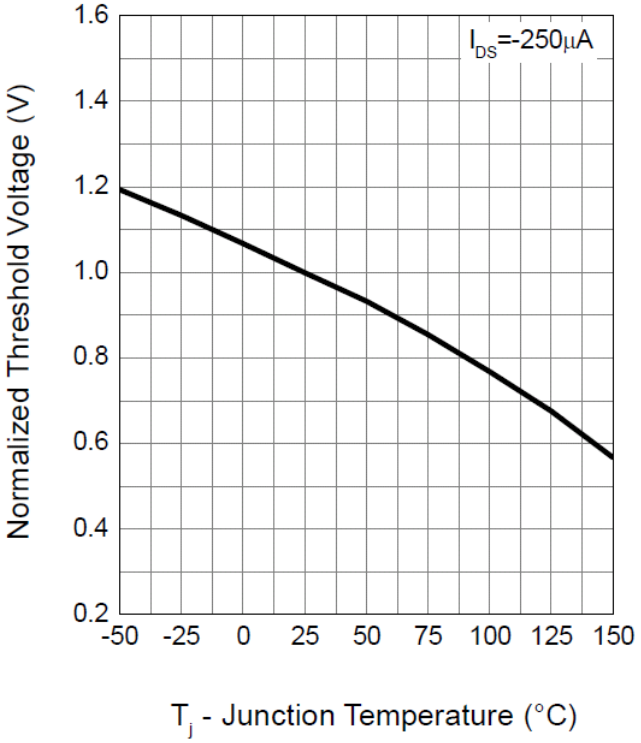

### Drain-Source On Resistance




### Gate-Source On Resistance

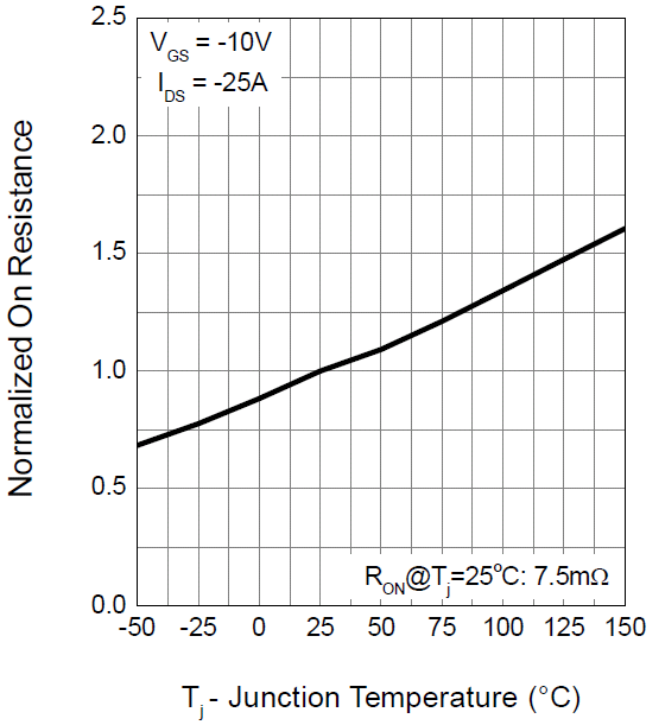



### Gate Threshold Voltage

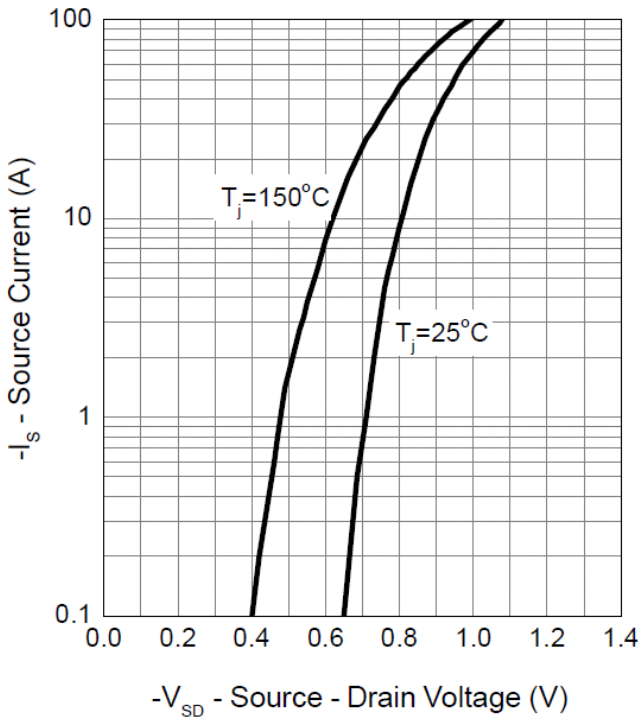


## Typical Operating Characteristics (Cont.)

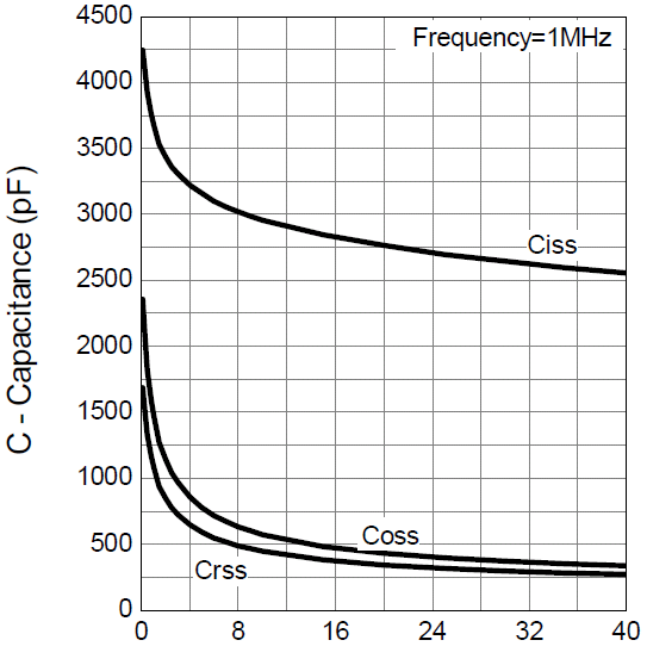
**Drain-Source On Resistance**



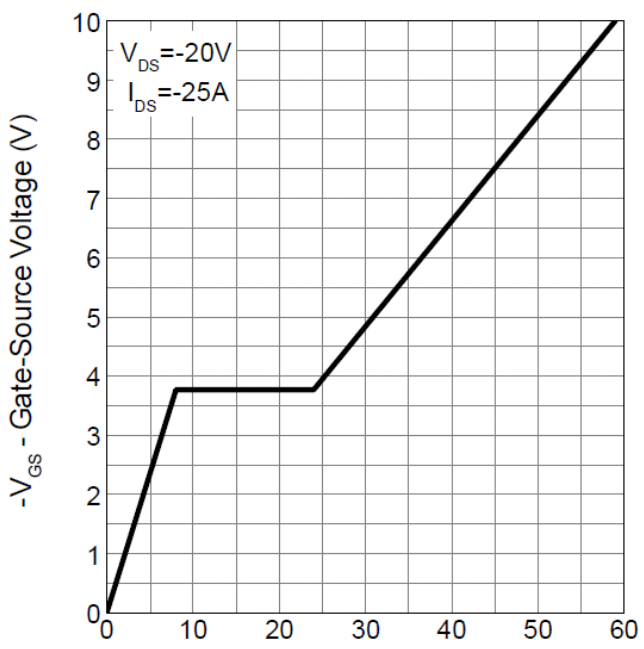

**Source-Drain Diode Forward**




**Capacitance**

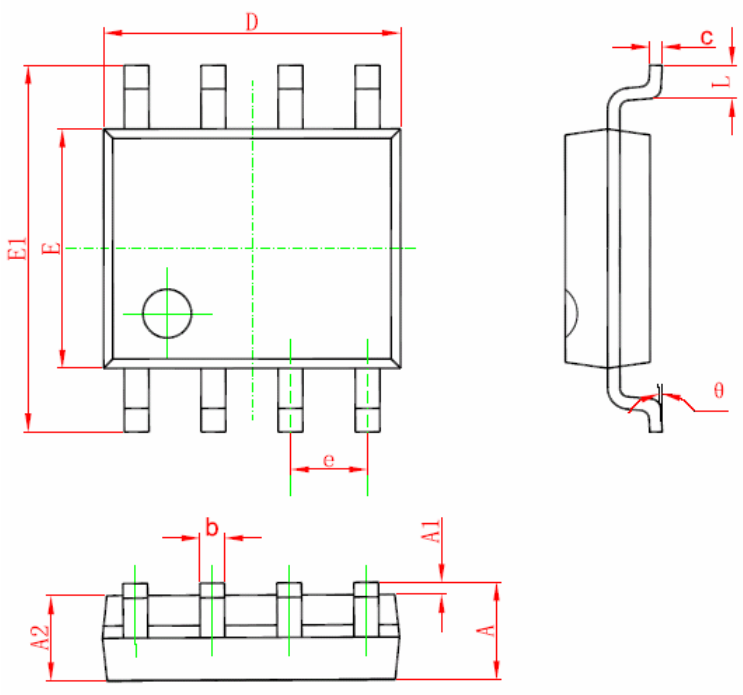



**Gate Charge**



## Package Information

SOP-8 Package




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

## Design Notes